

ORIGINAL ARTICLE

The genus *Neohirasea* Rehn (Phasmatodea: Diapheromeridae: Necrosiinae) from Vietnam

Wai-Chun George Ho

Hong Kong Entomological Society, P.O. Box No.73749, Kowloon Central Post Office, Hong Kong, China; E-mail: georgehwc@hotmail.com

Abstract The following five species and six subspecies in the genus *Neohirasea* Rehn from Vietnam are described as new to science: *N. biserrata* **sp. nov.**, *N. bispina bispina* **sp. nov. & subsp. nov.**, *N. bispina babeensis* **subsp. nov.**, *N. catbaensis* **sp. nov.**, *N. coomani* **sp. nov.**, *N. hilli hilli* **sp. nov. & subsp. nov.**, *N. hilli nahangensis* **subsp. nov.**, *N. hilli vietnamensis* **subsp. nov.** and *N. maerens pseudomaerens* **subsp. nov.** A key to the Vietnamese species and subspecies of this genus is provided.

Key words Stick insects, Necrosiini, new species, new subspecies, Vietnam.

1 Introduction

The stick insect genus *Neohirasea* Rehn, 1904, consists of seventeen species and six subspecies and is characterised by apterous and robust body, partially tuberculate and spinose thorax and weakly armed legs in the subfamily Necrosiinae (Shiraki, 1935; Hausleithner, 1992; Otte & Brock, 2005; Chen & He, 2008; Hennemann & Conle, 2008; Hennemann *et al.*, 2008; Mandal & Yadav, 2010; Komoto *et al.*, 2011; Ho, 2012, 2016, 2017; Bradler *et al.*, 2014; Brock *et al.*, 2017). *Neohirasea* is formerly treated as a member of the subfamily Lonchodinae (Otte & Brock, 2005; Hennemann & Conle, 2008). In Vietnam, six species, *N. asper* (Redtenbacher, 1908), *N. cochinchinensis* (Redtenbacher, 1908), *N. fruhstorferi* Brunner von Wattenwyl, 1907, *N. maerens* (Brunner von Wattenwyl, 1907), *N. nana* (Carl, 1913) and *N. stephanus* (Redtenbacher, 1908), are recognised. In this study, eleven new taxa from Vietnam including five new species and six new subspecies, *N. biserrata* **sp. nov.**, *N. bispina bispina* **sp. nov. & subsp. nov.**, *N. bispina babeensis* **subsp. nov.**, *N. catbaensis* **sp. nov.**, *N. coomani* **sp. nov.**, *N. hilli hilli* **sp. nov. & subsp. nov.**, *N. hilli nahangensis* **subsp. nov.**, *N. hilli vietnamensis* **subsp. nov.** and *N. maerens pseudomaerens* **subsp. nov.**, are described and illustrated. Currently, eleven species and seven subspecies are attributed to the *Neohirasea* of Vietnam.

2 Materials and methods

The examined materials were dried and pinned. The systematic treatment is according to Komoto *et al.* (2011) and Bradler *et al.* (2014). Morphological terms follow Rehn & Rehn (1939), Bragg (2001), Zompro (2004), Bradler (2009) and Hennemann *et al.* (2016). Ootaxonomic descriptions refer to Clark (1976, 1988 & 1998), Clark-Sellick (1997) and Zompro (2004). All measurements are given in millimetres (mm). The types are deposited in China Agricultural University, Beijing, China (CAU), Hong Kong Entomological Society, Hong Kong, China (HKES), Institute of Ecology and Biological Resources, Vietnam Academy of Science and Technology, Hanoi, Vietnam (IEBR), Institute of Zoology, Chinese Academy

urn:lsid:zoobank.org:pub:9D2B6952-9F5F-4F3A-8ADB-978C4A33DAD4

Received 1 January 2017, accepted 05 January 2018

Executive editor: Fuqiang Chen

of Sciences, Beijing, China (IZCAS) and Manchester Museum, University of Manchester, U.K. (MMUE).

3 Taxonomy

Neohirasea Rehn, 1904

Neohirasea Rehn, 1904: 84 (= *Paracentema* Redtenbacher, 1908). Type species: *Phasma (Acanthoderus) japonicum* Haan, 1842: 135 (= *Neohirasea japonica*), by original designation.

Diagnosis. Small to medium-sized. Dull colouration, usually brown. Body cylindrical, slender and elongate. Head oblong or oval. Thorax rough, usually wrinkled and granulated, partially tuberculate and/or spinose. Mesonotum multi spinose and obscurely or distinctly elevated with a tuberculate or spinose hump medially. Abdomen cylindrical, wrinkled and granulated. Seventh sternum with praeopercular organ in female. Female subgenital plate scoop-shaped. Male poculum cup-shaped. Supra-anal plate indistinct. Cerci short and flattened. Legs robust, slender and long, femora thicker than corresponding tibiae, with indistinct armature. Anteroventral and posteroventral carinae of femora with or lacking small spines or serrations near apices. Apterous. Egg capsule oval with oval micropylar plate.

Distribution. China, India, Japan, Malaysia and Vietnam. China and Vietnam is the distribution centre. Although there is no record of *Neohirasea* in Cambodia, Laos, Myanmar and Thailand, further collecting of specimens in various localities in these countries may discover certain populations in the region.

Remarks. Currently, twenty-two species and thirteen subspecies are recognised in *Neohirasea*. A key to the species and subspecies of the genus from Vietnam is provided. The males of *N. cochinchinensis* (Redtenbacher, 1908) and *N. stephanus* (Redtenbacher, 1908) are unknown and not included in the key.

Key to males of *Neohirasea* Redtenbacher, 1908 from Vietnam.

1. Anterior margin of pronotum with paired tubercles 2
Anterior margin of pronotum with paired spines 3
2. Mesonotum unarmed *N. nana* (Carl, 1913)
Mesonotum centrally armed with a pair of small spines *N. coomani* sp. nov.
3. Median segment unarmed 4
Median segment with paired spines 9
4. Mesonotum with curved spines *N. fruhstorferi* Brunner von Wattenwyl, 1907
Mesonotum with straight spines 5
5. Large size, body length longer than 45 mm 6
Small size, body length shorter than 40 mm 7
6. Metapleurae with a supra-coxal spine *N. bispina bispina* sp. nov. & subsp. nov.
Metapleurae with two supra-coxal spines *N. bispina babeensis* subsp. nov.
7. Anterior margin of pronotum with paired curved spines *N. hilli nahangensis* subsp. nov.
Anterior margin of pronotum with paired straight spines 8
8. Pronotum with two pairs of spines *N. hilli vietnamensis* subsp. nov.
Pronotum with one pair of spines *N. hilli hilli* sp. nov. & subsp. nov.
9. Second abdominal tergum unarmed *N. asper* (Redtenbacher, 1908)
Second abdominal tergum with paired spines 10
10. Occiput of head spinose 11
Occiput of head unarmed 12
11. Pronotum with two pairs of spines *N. maerens maerens* (Brunner von Wattenwyl, 1907) (s. str.)
Pronotum with one pair of spines *N. maerens pseudomaerens* subsp. nov.
12. Lateral margins of mesonotum with short and small spines *N. biserrata* sp. nov.
Lateral margins of mesonotum with long spines *N. catbaensis* sp. nov.

Key to females of *Neohirasea* Redtenbacher, 1908 from Vietnam.

1. Mesonotum swollen medially or post-medially 2
Mesonotum moderately expanded posteriorly 5
2. Anterior margin of pronotum with paired spines 3
Anterior margin of pronotum with paired tubercles 4
3. Seventh abdominal sternum with spine-like praeopercular organ *N. biserrata* sp. nov.
Seventh abdominal sternum lacking noticeable praeopercular organ *N. bispina bispina* sp. nov. & subsp. nov.

4. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of femora with two small serrations near apices *N. hilli hilli* sp. nov. & subsp. nov.
Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of femora unarmed *N. coomani* sp. nov.
5. Mesonotum centrally elevated with a pair of spinose lamellae *N. fruhstorferi* Brunner von Wattenwyl, 1907
Mesonotum centrally elevated with a spinose hump 6
6. Lateral margins of mesonotum with long tubercle-like spines or spines 7
Lateral margins of mesonotum with short tubercles or granules 10
7. Median segment unarmed *N. stephanus* (Redtenbacher, 1908)
Median segment with paired spines 8
8. Occiput of head unarmed *N. catbaensis* sp. nov.
Occiput of head spinose 9
9. Pronotum with two pairs of spines *N. maerens maerens* (Brunner von Wattenwyl, 1907) (s. str.)
Pronotum with one pair of spines *N. maerens pseudomaerens* subsp. nov.
10. Metapleurae with a long supra-coxal spine *N. cochinchinensis* (Redtenbacher, 1908)
Metapleurae with a short supra-coxal tubercle 11
11. Metanotum unarmed *N. nana* (Carl, 1913)
Metanotum with paired spines *N. asper* (Redtenbacher, 1908)

***Neohirasea biserrata* sp. nov.** (Figs 1–5, 38–45)

Diagnosis. This new species is similar to *N. maerens* (Brunner von Wattenwyl, 1907), but can be diagnosed by unarmed occiput of head in both sexes, two pairs of spines placed between anterior margin and transverse sulcus on pronotum and unarmed third and fourth abdominal tergites in male and post-medially swollen mesonotum and paired spine-like praeopercular organ on seventh abdominal sternum in female.

Description. Male. Body slender, smaller and much slender than female. Head oval, as long as pronotum. Vertex flat. Posterior margin of occiput with indistinct swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes rounded and small. Antennae filiform, sparsely covered with long bristles, surpassing apices of protarsi; scapus flattened at base, about 1.5 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax rough, with sparse granules. Pronotum rectangular, longer than wide, anterior margin weakly incurved, posterior margin truncate; transverse and longitudinal sulci crossing at middle area, with a pair of spines on anterior margin, also with another paired spines just placed before transverse sulcus. Mesonotum rough, more than 3 times as long as pronotum, gently expanded posteriorly in second half, median longitudinal carina indistinct; armed with paired spines anteriorly and post-medially, posterior area also with another 2 paired spines, posterior pair minute; also with paired minute mediolateral spines, lateral margins with a few short and small spines. Mesopleurae with a spine near posterior area and a short supra-coxal spine. Metanotum longer than median segment, with paired minute spines pre-medially and paired spines post-medially, lateral margins with a minute spine pre-medially. Metapleurae with a spine medially and 2 supra-coxal spines. Median segment square, with paired spines posteriorly. Second tergum with paired spines posteriorly. Eighth tergum almost as long as ninth tergum. Anal segment as long as ninth tergum, constricted posteriorly after middle area, with a small emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and surpassing anterior margin of anal segment. Cerci flattened, weakly incurved, apices rounded and not surpassing posterior margin of anal segment. Vomer with elongate apical part; apical part distinctly emarginated medially, posterior margin truncated with apically obtuse serrations. Legs slender and long, sparsely covered with short bristles, unarmed. All femora thicker than corresponding tibiae, posteroventral and anteroventral carinae with 2 small serrations near apices. Profemora curved basally.

Female. Similar to male, but distinctly larger and more robust. Head oval. Occiput and vertex flat. Posterior margin of head with 6 small swellings. Median longitudinal furrow distinct. Compound eyes rounded. Antennae filiform and long, sparsely covered with short bristles; scapus flattened basally, shorter than third segment; pedicellus shorter than scapus; third segment as long as combined length of scapus and pedicellus. Thorax rough, with wrinkles, granules and tubercles. Pronotum slightly shorter than head, anterior margin with a pair of short spines, apices pointing forwards, transverse and longitudinal sulci crossing at middle area. Mesonotum constricted anteriorly and posteriorly, distinctly swollen post-medially, median longitudinal carina distinct; armed with paired spines anteriorly, medially and posteriorly, also with paired minute posterolateral spines; lateral margins with small and short tubercle-like spines. Mesopleurae with a short tubercle-like spine on posterior area and a short tubercle-like supra-coxal spine. Metanotum longer than median segment, median longitudinal carina distinct, with paired spines post-medially. Metapleurae with a short tubercle-like spine on posterior area and 2 short tubercle-like supra-coxal spines. Abdomen wrinkled, distinctly tapering posteriorly. Seventh sternum with paired spine-like praeopercular organ posteromedially. Ninth tergum shorter than eighth tergum, with a small crest posteromedially. Anal

segment longer than ninth tergum, as long as eighth tergum, with 2 small emarginations on posterior margin. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and reaching posterior margin of anal segment. Cerci small, flattened, apices pointed and not surpassing posterior margin of anal segment. Legs covered with short bristles. All femora thick-built, thicker than corresponding tibiae. Profemora curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of all femora with 2 small serrations near apices. All tibiae unarmed.

Measurements. Length. Body, ♂ 40.0–49.0 mm, ♀ 45.0–50.0 mm; antennae, ♂ 38.0–42.0 mm, ♀ 28.0–32.0 mm; head, ♂ 3.0 mm, ♀ 4.0 mm; pronotum, ♂ 3.0 mm, ♀ 3.5 mm; mesonotum, ♂ 10.5–12.5 mm, ♀ 10.5–11.5 mm; metanotum, ♂ 3.0–4.0 mm, ♀ 4.5–5.0 mm; median segment, ♂ 2.5–3.0 mm, ♀ 1.0 mm; profemora, ♂ 12.0–15.0 mm, ♀ 12.5–13.0 mm; mesofemora, ♂ 11.0–13.0 mm, ♀ 10.0–11.0 mm; metafemora, ♂ 14.0–17.5 mm, ♀ 13.0–15.0 mm; protibiae, ♂ 15.0–18.0 mm, ♀ 14.5–15.0 mm; mesotibiae, ♂ 12.0–15.0 mm, ♀ 10.5–12.0 mm; metatibiae, ♂ 18.0–22.0 mm, ♀ 16.0–18.0 mm.

Egg. Capsule grayish brown with olive-green markings, oval, densely granulated, posterior pole rounded. Micropylar plate yellowish brown, nearly rounded. Micropylar cup placed near posterior margin of micropylar plate. Median line indistinct. Operculum olive-green, with a dorsoventrally flattened capitulum, surface rugose.

Measurements. Capsule length 2.2 mm, width 1.6 mm, height 2.0 mm.

Material examined. Holotype ♂, Vietnam, Thua Thien Hue, Bachma Mountain, 18–19 September 2016, He Li (HKES). Paratypes. 5♂, 8♀, 10 eggs, same data as holotype (HKES & MMUE); 6♂, 5♀, Vietnam, Thua Thien Hue, Phu Loc, Bach Ma, 27–28 September 2011, Xingyue Liu (CAU & IEBR).

Distribution. Vietnam.

Etymology. The specific epithet of this new species is derived from the two small serrations on the posteroventral and anteroventral carinae of femora in both sexes.

Neohirasea bispina bispina sp. nov. & subsp. nov. (Figs 6–10, 46–49)

Diagnosis. This new species is similar to *N. biserrata* sp. nov., but can be easily diagnosed by one pair of spines on pronotum and unarmed median segment in male and indistinctly swollen medially mesonotum and lacking noticeable praeopercular organ on seventh abdominal sternum in female.

Description. Male. Body slender, distinctly much slender than female. Head oval, shorter than pronotum. Vertex flat. Posterior margin of occiput with 6 small swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes rounded and small. Antennae long and filiform, sparsely covered with long bristles, surpassing apices of protarsi; scapus flattened at base, about 2 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax with very few small granules. Pronotum rectangular, longer than wide, anterior and posterior margins nearly truncate; transverse and longitudinal sulci crossing before middle area, with a pair of spines on anterior margin, apices pointing forwards. Mesonotum elongate, more than 3 times as long as pronotum, broadly emarginated medially; median longitudinal carina indistinct, with paired spines anteriorly, post-medially and posteriorly, also with a pair of short mediolateral spines, lateral margins with a few short spines. Mesopleurae with a medial spine near posterior area and a supra-coxal spine. Metanotum longer than median segment, with paired spines post-medially. Metapleurae with a medial spine and a supra-coxal spine. Median segment rectangular, longer than wide, unarmed. Eighth tergum almost as long as ninth tergum, with a small hump-like crest posteromedially. Anal segment longer than ninth tergum, with a broad V-shaped emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and reaching posterior margin of ninth tergum. Cerci flattened, curved inwards, apices rounded and not surpassing posterior margin of anal segment. Vomer with posteriorly constricted apical part, apex distinctly pointed and slightly curved. Legs very slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae, posteroventral and anteroventral carinae with 2 small serrations near apices. Profemora curved basally. All tibiae maculated, longer than corresponding femora.

Female. Similar to male, but distinctly larger and more robust. Head oval, as long as pronotum. Vertex and occiput flat. Posterior margin of head with 8 small swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes oval and small. Antennae filiform and long, sparsely covered with short bristles; scapus flattened basally, almost as long as third segment; pedicellus shorter than scapus. Thorax rough, with wrinkles, granules and spines. Pronotum rectangular, longer than wide, anterior margin with a pair of short spines, apices pointing forwards, transverse and longitudinal sulci crossing just before middle area. Mesonotum constricted anteriorly and posteriorly, indistinctly swollen medially; median longitudinal carina indistinct, armed with paired spines anteriorly, medially and posteriorly, also with a pair of short mediolateral spines; lateral margins with a few short spines. Mesopleurae with a few short spines and a short supra-coxal spine. Metanotum longer than median segment, median longitudinal carina indistinct, with paired spines post-medially, lateral margins with a short spine post-medially. Metapleurae with a medial spine and 2 supra-coxal spines. Abdomen wrinkled, distinctly tapering posteriorly. Median segment wider than long, with paired spines post-medially.

Seventh sternum lacking noticeable praeopercular organ. Ninth tergum shorter than eighth tergum, with a small dorsoventrally flattened crest posteromedially. Anal segment longer than ninth tergum, almost as long as eighth tergum, with 2 small emarginations on posterior margin. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and not reaching posterior margin of anal segment. Cerci small, flattened, apices pointed and not surpassing posterior margin of anal segment. Legs slender and long, maculated, covered with short bristles. All femora thick-built, thicker than corresponding tibiae. Profemora curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of all femora with 2 small serrations near apices. All tibiae unarmed, longer than corresponding femora.

Measurements. Length. Body, ♂ 48.0–51.0 mm, ♀ 60.0–62.0 mm; antennae, ♂ 45.0–48.0 mm, ♀ 39.0–41.0 mm; head, ♂ 3.0–3.5 mm, ♀ 5.0 mm; pronotum, ♂ 3.5–4.0 mm, ♀ 5.0 mm; mesonotum, ♂ 12.0–13.0 mm, ♀ 14.0 mm; metanotum, ♂ 4.0 mm, ♀ 4.5–5.0 mm; median segment, ♂ 2.0–2.5 mm, ♀ 3.0 mm; profemora, ♂ 17.0 mm, ♀ 17.0 mm; mesofemora, ♂ 14.0 mm, ♀ 14.0 mm; metafemora, ♂ 20.0–21.0 mm, ♀ 19.0–20.0 mm; protibiae, ♂ 20.0 mm, ♀ 18.0–20.0 mm; mesotibiae, ♂ 15.0 mm, ♀ 15.0–16.0 mm; metatibiae, ♂ 23.0–24.0 mm, ♀ 23.0–25.0 mm.

Material examined. Holotype ♂, North Vietnam, NaHang Nature Reserve, In cleared area in 2° forest (22°16'–22°31'N, 105°22'–105°29'E), 15 July 1996, M.J. Hill, F3309.14, VN9603 P.10 (MMUE). Paratypes. 1 ♀, North Vietnam, NaHang Nature Reserve, In 2° forest not on plant (22°16'–22°31'N, 105°22'–105°29'E), 17 July 1996, M.J. Hill, F3309.12, VN9603 P.21 (MMUE); 1 ♀, North Vietnam, NaHang Nature Reserve, In 2° forest nr camp on Rubiaceae (22°16'–22°31'N, 105°22'–105°29'E), 20 July 1996, M.J. Hill, F3309.13, VN9603 P.24 (MMUE); 1 ♂, 1 ♀, North Vietnam, NaHang Nature Reserve, Forest transect 1 on Rhamnaceae (22°16'–22°31'N, 105°22'–105°29'E), 30 July 1996, M.J. Hill, F3309.10–11, VN9603 P.40–41 (HKES).

Distribution. Vietnam.

Etymology. The specific epithet of this new species is derived from the two spines on the anterior margin of pronotum in both sexes.

Neohirasea bispina babeensis subsp. nov. (Figs 11–12, 50)

Diagnosis. This new subspecies is similar to the nominate *N. bispina bispina* sp. nov. & subsp. nov., but can be separated by larger size, longer lateral spines on mesonotum, paired spines on median segment and two supra-coxal spines on metapleurae.

Description. Male. Body slender and long. Head and antennae as in nominate race. Thorax with a few small granules. Pronotum rectangular, longer than wide, anterior margin nearly truncate, posterior margin rounded; transverse and longitudinal sulci crossing before middle area, with a pair of spines on anterior margin, apices pointing forwards. Mesonotum elongate, more than 3 times as long as pronotum, gently expanded posteriorly; median longitudinal carina indistinct, with paired spines anteriorly, post-medially and posteriorly, also with a pair of short mediolateral spines, lateral margins with a few spines. Mesopleurae with a spine near posterior area and a supra-coxal spine. Metanotum longer than median segment, with paired spines post-medially, lateral margins with a short spines post-medially. Metapleurae with a medial spine and 2 supra-coxal spines. Median segment rectangular, longer than wide, with paired spines post-medially. Eighth tergum almost as long as ninth tergum. Anal segment longer than ninth tergum, with a broad V-shaped emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and reaching anterior margin of anal segment. Cerci and vomer as in nominate race. Legs as in nominate race.

Female. Unknown.

Measurements. Length. Body, ♂ 60.0 mm; antennae, ♂ 50.0 mm; head, ♂ 4.0 mm; pronotum, ♂ 4.5 mm; mesonotum, 15.0 mm; metanotum, ♂ 5.0 mm; median segment, ♂ 3.0 mm; profemora, ♂ 17.0 mm; mesofemora, ♂ 14.0 mm; metafemora, ♂ 20.0 mm; protibiae, ♂ 19.0 mm; mesotibiae, ♂ 15.0 mm; metatibiae, ♂ 24.0 mm.

Material examined. Holotype ♂, North Vietnam, Ba Be National Park, Teonagria, Bumetadendron Forest nr small lake on Syzygium, Moraceae (22°23'N, 105°37'E), 13 October 1996, M.J. Hill, BB P01, F3309.17 (MMUE).

Distribution. Vietnam.

Etymology. The specific epithet of this new subspecies is derived from the type locality, Ba Be National Park in North Vietnam.

Neohirasea catbaensis sp. nov. (Figs 13–17, 51–54)

Diagnosis. This new species is related to *N. biserrata* sp. nov., but can be separated by large size and long lateral spines on mesonotum in both sexes, two long spines on lateral margins of metanotum and a pair of posterior spines on third to fifth abdominal tergites in male and moderately expanded posteriorly mesonotum and horn-like praeopercular organ on seventh

abdominal sternum in female.

Description. Male. Body slender, distinctly smaller than female. Head oval, as long as pronotum. Vertex flat. Posterior margin of occiput with 6 indistinct swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes rounded and small. Antennae filiform and long, sparsely covered with long bristles, surpassing apices of protarsi; scapus flattened at base, about 1.5 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax rough, with sparse granules. Pronotum rectangular, longer than wide, anterior margin weakly incurved, posterior margin truncate; transverse and longitudinal sulci crossing at middle area, with a pair of spines on anterior margin, also with another pair of spines placed before transverse sulcus. Mesonotum rough, more than 3 times as long as pronotum, gently expanded posteriorly; median longitudinal carina indistinct, with paired spines anteriorly, post-medially and posteriorly, also with paired mediolateral spines, lateral margins with long spines. Mesopleurae with a spine near posterior area and a supra-coxal spine. Metanotum with paired spines post-medially, longer than median segment, lateral margins with long spines anteriorly and pre-medially. Metapleurae with a spine medially and with 2 supra-coxal spines. Median segment square, with paired spines post-medially. Second to fifth tergites with paired spines posteriorly, gradually reduced in size posteriorly. Eighth tergum as long as ninth tergum. Anal segment longer than ninth tergum, lateral margins gently elevated medially, constricted posteriorly after middle area, with a small V-shaped emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and surpassing anterior margin of anal segment. Cerci flattened, weakly incurved, apices rounded and surpassing posterior margin of anal segment. Vomer with posteriorly constricted apical part, apex obtuse. Legs slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae, posteroventral and anteroventral carinae with 2 small serrations near apices. Profemora curved basally. All tibiae unarmed.

Female. Similar to male, but distinctly larger and more robust. Head oval, as long as pronotum. Vertex flat. Occiput gently convex, posterior margin of head with 8 small swellings. Median longitudinal furrow distinct. Compound eyes rounded. Antennae filiform and long, sparsely covered with short bristles; scapus flattened basally, almost as long as third segment; pedicellus shorter than scapus; third segment shorter than combined length of scapus and pedicellus. Thorax rough, with wrinkles, granules and spines. Pronotum rectangular, longer than wide, anterior margin and pre-medial area with paired spines, transverse and longitudinal sulci crossing at middle area. Mesonotum moderately expanded posteriorly, median longitudinal carina distinct, armed with paired spines anteriorly, medially and posteriorly, also with paired mediolateral and posterolateral spines, lateral margins with long spines. Mesopleurae with a spine near posterior area. Metanotum longer than median segment, median longitudinal carina distinct, with paired spines post-medially, lateral margins with 2 spines anteriorly and pre-medially. Metapleurae with a medial spine, also with 2 supra-coxal spines. Abdomen wrinkled, tapering posteriorly. Median segment to fourth tergites with paired spines posteriorly, gradually reduced in size posteriorly. Seventh sternum with a distinct horn-like praeopercular organ posteromedially, elongated and tapering posteriorly, apex pointed and surpassing anterior margin of subgenital plate. Ninth tergum shorter than eighth tergum, with a small crest posteromedially. Anal segment longer than ninth tergum, almost as long as eighth tergum, with 2 obscure emarginations on posterior margin. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and reaching posterior margin of anal segment. Cerci small, flattened, apices rounded and not surpassing posterior margin of anal segment. Legs slender and long, covered with short bristles. All femora thick-built, thicker than corresponding tibiae. Profemora curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of all femora with 2 small serrations near apices. All tibiae unarmed, longer than corresponding femora.

Measurements. Length. Body, ♂ 60.0 mm, ♀ 80.0 mm; antennae, ♂ 60.0 mm, ♀ 60.0 mm; head, ♂ 4.0 mm, ♀ 6.0 mm; pronotum, ♂ 4.0 mm, ♀ 6.0 mm; mesonotum, ♂ 15.0 mm, ♀ 18.0 mm; metanotum, ♂ 5.0 mm, ♀ 6.0 mm; median segment, ♂ 3.0 mm, ♀ 4.0 mm; profemora, ♂ 20.0 mm, ♀ 22.0 mm; mesofemora, ♂ 16.0 mm, ♀ 18.0 mm; metafemora, ♂ 22.0 mm, ♀ 25.0 mm; protibiae, ♂ 25.0 mm, ♀ 25.0 mm; mesotibiae, ♂ 18.0 mm, ♀ 20.0 mm; metatibiae, ♂ 28.0 mm, ♀ 30.0 mm.

Material examined. Holotype ♂, Vietnam, Hai Phong, Cat Ba National Park, 5 October 2011, Xingyue Liu (CAU). Paratypes. 1 ♀, same data as holotype (CAU); 3 ♂, 5 ♀, Hai Phong, Cat Ba Island, Cat Ba National Park, c. 10 km NW of Cat Ba City (20°47'56"N, 106°59'47"E; elev. 50 m), October 2011, A.V. Abramov, F3417.63–68 (MMUE & HKES).

Distribution. Vietnam.

Etymology. The specific epithet of this new species is derived from the type locality, Cat Ba National Park in North Vietnam.

***Neohirasea coomani* sp. nov.** (Figs 18–23, 55–56)

Diagnosis. This new species is similar to *N. biserrata* sp. nov., but can be separated by indistinctly waved femora in both sexes, a pair of medial spines on mesonotum in male and broadly flattened praeopercular organ on seventh abdominal sternum in female.

Description. Female. Similar to male, but distinctly larger and more robust. Head oval, almost as long as pronotum. Occiput and vertex flat. Posterior margin of head with 8 small swellings. Median longitudinal furrow distinct. Compound eyes oval and small. Genae with a short carina behind compound eyes. Antennae broken, sparsely covered with short bristles; scapus with indistinct median elevation, flattened basally, longer than third segment; pedicellus slightly as long as third segment. Thorax rough, with wrinkles, granules and tubercles. Pronotum rectangular, longer than wide, anterior margin with a pair of short tubercles, apices pointing forwards, transverse and longitudinal sulci crossing just before middle area. Mesonotum with wrinkles and small granules, weakly constricted anteriorly, distinctly swollen medially and weakly narrowing in posterior half; median longitudinal carina distinct, middle area armed with a pair of short tubercles; lateral margins with a few small and short tubercles. Mesopleurae with a few short tubercles and a short supra-coxal tubercle. Metanotum slightly longer than median segment, median longitudinal carina distinct. Metapleurae with a short supra-coxal tubercle. Abdomen wrinkled, distinctly tapering posteriorly. Seventh sternum with broadly flattened praeopercular organ, posterior margin truncate, posterolateral angles rounded. Ninth tergum as long as eighth tergum, with a small crest posteromedially. Anal segment as long as ninth tergum, with 2 small emarginations on posterior margin. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and reaching posterior margin of anal segment. Cerci small and short, flattened, apices pointed and not surpassing posterior margin of anal segment. Legs covered with short bristles. All femora thick-built, thicker than corresponding tibiae. Profemora curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of mesofemora and metafemora waved with indistinct elevations.

Male. Body robust, smaller and much slender than female. Head oval, as long as pronotum. Vertex flat. Posterior margin of occiput with indistinct swellings. Median and lateral longitudinal furrows distinct. Compound eyes oval and small. Antennae incomplete, filiform, sparsely covered with short bristles; scapus flattened at base, 1.5 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax rough, with sparse granules. Pronotum rectangular, longer than wide, slightly longer than head; anterior margin truncate, with a pair of small spines, posterior margin rounded; transverse and longitudinal sulci crossing at middle area. Mesonotum rough, about 3 times as long as pronotum, gently expanded posteriorly in second half; median longitudinal carina distinctly elevated, with a pair of short spines medially. Mesopleurae with a short tubercle near posterior area and a supra-coal tubercle. Metanotum trapezoidal, gently narrowing posteriorly, with distinctly elevated median longitudinal carina, longer than median segment. Metapleurae with a short supra-coxal tubercle. Median segment square. Eighth tergum gently expanded posteriorly, as long as ninth tergum. Anal segment roughly as long as ninth tergum, with a small indistinct emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and reaching posterior margin of ninth tergum. Cerci flattened, apices rounded and not surpassing posterior margin of anal segment. Legs slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae, anterodorsal and posterodorsal carinae waved with indistinct elevations. Profemora curved basally, longer than mesonotum.

Measurements. Length. Body, ♂ 39.0 mm, ♀ 45.0 mm; head, ♂ 2.5 mm, ♀ 4.0 mm; pronotum, ♂ 2.5 mm, ♀ 3.5 mm; mesonotum, ♂ 8.0 mm, ♀ 9.5 mm; metanotum, ♂ 2.5 mm, ♀ 2.5 mm; median segment, ♂ 2.0 mm, ♀ 2.0 mm; profemora, ♂ 11.0 mm, ♀ 10.5 mm; mesofemora, ♂ 9.0 mm, ♀ 8.5 mm; metafemora, ♂ 13.5 mm, ♀ 12.5 mm; protibiae, ♂ 12.5 mm, ♀ 11.0 mm; mesotibiae, ♂ 10.0 mm, ♀ 9.0 mm; metatibiae, ♂ 15.5 mm, ♀ 14.5 mm.

Material examined. Holotype ♀, Tonkin (North Vietnam), Hoa Binh, no date data, A. De Cooman (IZCAS). Paratypes 2♂, same data as holotype (IZCAS).

Distribution. Vietnam.

Remarks. The antennae of holotype and paratypes are incomplete and its measurements are insufficiently provided.

Etymology. It is named in honour of A. De Cooman for his discovery of this new species.

Neohirasea hilli hilli sp. nov. & subsp. nov. (Figs 24–27, 57–60)

Diagnosis. This new species is similar to *N. biserrata* sp. nov., but can be diagnosed by small size and more robust body in both sexes, a pair of spines on pronotum and unarmed median segment in male and hump-like praeopercular organ on seventh abdominal sternum in female.

Description. Male. Head oval, longer than pronotum. Vertex flat. Posterior margin of occiput with indistinct swellings. Median and lateral longitudinal furrows distinct. Compound eyes rounded and small. Antennae incomplete, sparsely covered with short bristles; scapus flattened at base, 2 times as long as pedicellus, roughly as long as third segment. Thorax rough, with sparse granules and short wrinkles. Pronotum rectangular, longer than wide, anterior margin incurved, posterior margin truncate; transverse and longitudinal sulci crossing at middle area, with a pair of straight spines on anterior margin. Mesonotum rough, more than 3 times as long as pronotum, gently expanded posteriorly in second half; median longitudinal carina distinctly elevated, with spines anteriorly, pre-medially, post-medially and posteriorly. Mesopleurae with a short

supra-coxal tubercle. Metanotum longer than median segment. Metapleurae with a supra-coxal spines. Median segment square and unarmed. Eighth tergum as long as ninth tergum. Anal segment wider than long, longer than ninth tergum, lateral margins gently elevated pre-medially, with a small emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and not surpassing anterior margin of anal segment. Cerci short, flattened, apices rounded and not surpassing end of anal segment. Legs slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae indistinctly waved. Profemora curved basally, posteroventral and anteroventral carinae with a small serration near apices. Posteroventral and anteroventral carinae of mesofemora and metafemora with 2 small serrations near apices. Tibiae unarmed.

Female. Similar to male, but distinctly larger and more robust. Head oval. Occiput and vertex flat. Posterior margin of head with 6 small swellings. Median longitudinal furrow distinct. Compound eyes rounded. Antennae incomplete, apices not surpassing apices of protarsi, filiform and long, sparsely covered with short bristles; scapus flattened basally, roughly as long as third segment; pedicellus shorter than scapus. Thorax rough, with wrinkles and granules. Pronotum shorter than head, anterior margin with a pair of short tubercles, apices pointing forwards, transverse and longitudinal sulci crossing at middle area. Mesonotum constricted anteriorly and posteriorly, indistinctly swollen medially; median longitudinal carina distinct, with paired short tubercles anteriorly, medially and posteriorly; lateral margins with small and short tubercles. Metanotum longer than median segment, median longitudinal carina distinct, with paired short tubercles near middle area. Mesopleurae and metapleurae with a few short tubercles. Abdomen wrinkled, also with sparse small granules, tapering posteriorly. Fifth to ninth tergites with a small obscure crest posteromedially. Seventh sternum with an obscurely elevated hump-like praeopercular organ posteromedially. Ninth tergum shorter than eighth tergum. Anal segment longer than ninth tergum, constricted posteriorly, with a small indistinct emargination on posterior margin. Supra-anal plate small, posterior margin rounded. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and reaching middle area of anal segment. Cerci small, flattened, apices pointed and not surpassing posterior margin of anal segment. Legs covered with short bristles. All femora thick-built, thicker than corresponding tibiae. Profemora curved basally. Anterodorsal, posterodorsal, anteroventral and posteroventral carinae of all femora with 2 small indistinct serrations near apices.

Measurements. Length. Body, ♂ 33.0 mm, ♀ 48.0 mm; head, ♂ 3.5 mm, ♀ 5.0 mm; pronotum, ♂ 2.5 mm, ♀ 4.0 mm; mesonotum, ♂ 8.0 mm, ♀ 11.0 mm; metanotum, ♂ 3.0 mm, ♀ 3.5 mm; median segment, ♂ 1.5 mm, ♀ 2.0 mm; profemora, ♂ 9.0 mm, ♀ 11.0 mm; mesofemora, ♂ 7.0 mm, ♀ 9.0 mm; metafemora, ♂ 10.0 mm, ♀ 12.0 mm; protibiae, ♂ 10.0 mm, ♀ 11.0 mm; mesotibiae, ♂ 7.0 mm, ♀ 10.0 mm; metatibiae, ♂ 12.0 mm, ♀ 15.0 mm.

Material examined. Holotype ♂, North Vietnam, Ba Be National Park, 1° forest Nam Giai (22°23'N, 105°37'E; elev. 600 m), 28 October 1996, M.J. Hill, BB P12, F3309.39 (MMUE). Paratype. 1 ♀, same data as holotype, BB P13, F3309.40 (MMUE).

Distribution. Vietnam.

Remarks. The antennae of holotype and paratype are incomplete and its measurements are insufficiently provided.

Etymology. It is named in honour of M. J. Hill for his discovery of this new species.

***Neohirasea hilli nahangensis* subsp. nov.** (Figs 28–29, 61, 63)

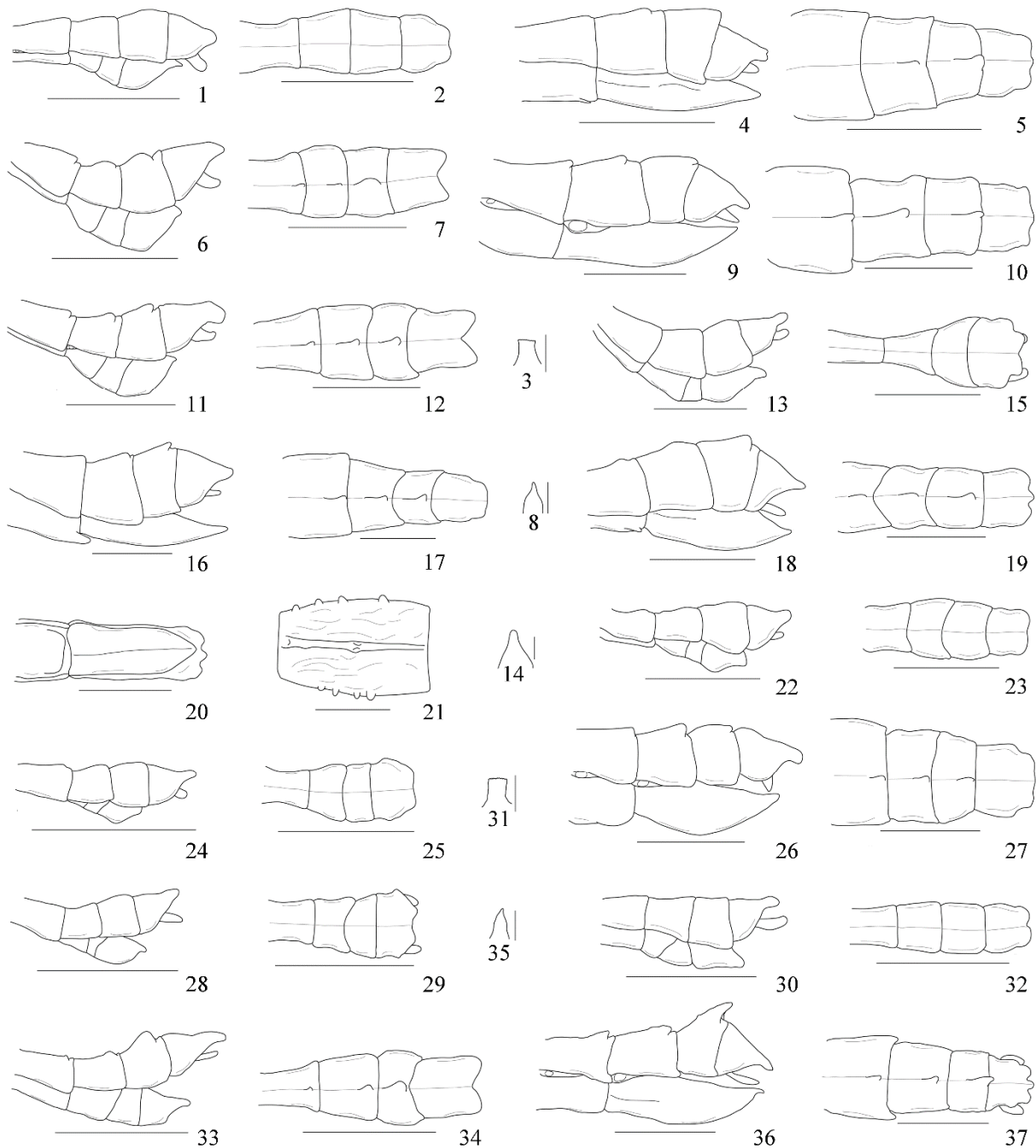
Diagnosis. This new subspecies is similar to the nominate *N. hilli hilli* **sp. nov. & subsp. nov.** and *N. hilli vietnamensis* **subsp. nov.**, but can be diagnosed by anteriorly curved spines on anterior margin of pronotum, three pairs of spines on mesonotum, posteriorly emarginated poculum and posteroventral and anteroventral carinae of profemora with three small serrations near apices.

Description. Male. Head as in nominate race. Compound eyes oval and small. Antennae incomplete; scapus flattened at base, 2 times as long as pedicellus, roughly as long as third segment. Thorax rough, with sparse granules and short wrinkles. Pronotum rectangular, longer than wide, anterior margin weakly incurved, posterior margin truncate; transverse and longitudinal sulci crossing at middle area, with a pair of curved spines on anterior margin, apices pointing forwards. Mesonotum rough, more than 3 times as long as pronotum, gently expanded posteriorly in second half; median longitudinal carina indistinct, with paired spines anteriorly, post-medially and posteriorly. Mesopleurae with very few granules. Metanotum with paired spines near middle area, longer than median segment. Metapleurae with a supra-coxal spines. Median segment square, unarmed. Second tergum with a pair of short tubercles, other tergites unarmed. Eighth tergum almost as long as ninth tergum. Anal segment broader wider than long, longer than ninth tergum, lateral margins elevated medially, posterior margin with a small emargination. Poculum cup-shaped, posterior margin emarginated and surpassing anterior margin of anal segment. Cerci flattened, apices rounded and surpassing end of anal segment. Legs slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae indistinctly waved. Profemora curved basally, anteroventral and posteroventral carinae with 3 small

serrations near apices. Anteroventral and posteroventral carinae of mesofemora and metafemora with 2 small serrations near apices.

Female. Unknown.

Measurements. Length. Body, ♂ 33.0 mm; head, ♂ 3.5 mm; pronotum, ♂ 2.5 mm; mesonotum, 8.0 mm; metanotum, ♂ 2.5 mm; median segment, ♂ 2.0 mm; profemora, ♂ 8.5 mm; mesofemora, ♂ 7.0 mm; metafemora, ♂ 9.0 mm; protibiae, ♂ 9.0 mm; mesotibiae, ♂ 7.5 mm; metatibiae, ♂ 10.5 mm.



Figures 1–37. *Neohirasea* spp. 1–5. *N. biserrata* sp. nov. 6–10. *N. bispina bispina* sp. nov. & subsp. nov. 11–12. *N. bispina babeensis* subsp. nov. 13–17. *N. catbaensis* sp. nov. 18–23. *N. coomani* sp. nov. 24–27. *N. hilli hilli* sp. nov. & subsp. nov. 28–29. *N. hilli nahangensis* subsp. nov. 30–32. *N. hilli vietnamensis* subsp. nov. 33–37. *N. maerens pseudomaerens* subsp. nov. 1, 6, 11, 13, 22, 24, 28, 30, 33. Male end of abdomen, lateral view. 2, 7, 12, 15, 23, 25, 29, 32, 34. Male end of abdomen, dorsal view. 3, 8, 14, 31, 35. Male vomer, ventral view. 4, 9, 16, 18, 26, 36. Female end of abdomen, lateral view. 5, 10, 17, 19, 27, 37. Female end of abdomen, dorsal view. 20. Female end of abdomen, ventral view. 21. Female mesonotum, dorsal view. Scale bars: 1–2, 4–7, 9–13, 15–30, 32–34 = 5 mm; 3, 8, 14, 31, 35 = 1 mm.



Figures 38–50. *Neohirasea* spp. 38–45. *N. biserrata* **sp. nov.** 46–49. *N. bispina bispina* **sp. nov. & subsp. nov.** 50. *N. bispina babeensis* **subsp. nov.** 38, 46, 50. Male habitus. 39, 47. Female habitus. 40. Egg, lateral view. 41. Egg, dorsal view. 42, 48. Male head and thorax, dorsolateral view. 43, 49. Female head and thorax, dorsolateral view. 44. Female end of abdomen, ventral view. 45. Female head and thorax, dorsal view. Scale bars: 38–39, 42–50 = 5 mm; 40–41 = 1 mm.

Material examined. Holotype ♂, North Vietnam, NaHang Nature Reserve (22°16'–22°31'N, 105°22'–105°29'E), 1996, M.J. Hill, F3309.75 (MMUE).

Distribution. Vietnam.

Remarks. The antennae of holotype is incomplete and its measurements are insufficiently provided.

Etymology. The specific epithet of this new subspecies is derived from the type locality, NaHang Nature Reserve in North Vietnam.

***Neohirasea hilli vietnamensis* subsp. nov.** (Figs 30–32, 62, 64)

Diagnosis. This new subspecies is similar to the nominate *Neohirasea hilli hilli* **sp. nov. & subsp. nov.**, but can be diagnosed by the third antennal segment longer than combined length of scapus and pedicellus, presence of a medial spine on mesopleurae, longer legs, lacking wavy elevations on femora and posteroventral and anteroventral carinae of profemora

with two small serrations near apices.

Description. Male. Head as in nominate race. Compound eyes oval and small. Antennae filiform and long, surpassing apices of protarsi, sparsely covered with short bristles; scapus flattened basally, 2 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax rough, with sparse granules and short wrinkles. Pronotum rectangular, longer than wide, anterior margin weakly incurved, posterior margin truncate; transverse and longitudinal sulci crossing at middle area, with a pair of straight spines on anterior margin, also with another pair of comparatively smaller spines placed before transverse sulcus. Mesonotum rough, more than 3 times as long as pronotum, gently expanded posteriorly in second half; median longitudinal carina distinctly elevated, with spines anteriorly, pre-medially, post-medially and posteriorly. Mesopleurae with a short tubercle-like spine near posterior area and a short tubercle-like supra-coxal tubercle. Metanotum with paired spines near middle area, longer than median segment. Metapleurae with a tubercle-like medial spine and a tubercle-like supra-coxal spine. Median segment square, unarmed. Second tergum with paired spines posteriorly. Eighth tergum as long as ninth tergum. Anal segment slightly longer than ninth tergum, longer than wide, with a small emargination on posterior margin. Poculum cup-shaped, posterior margin rounded and surpassing anterior margin of anal segment. Cerci cylindrical, apices rounded and surpassing end of anal segment. Vomer with elongate apical part; apical part parallel-sided, posterior margin truncate with apically pointed serrations. Legs slender and long, sparsely covered with short bristles, unarmed. All femora thicker than corresponding tibiae, lacking wavy elevation. Profemora curved basally, posteroventral and anteroventral carinae with 2 small serrations near apices. Posteroventral and anteroventral carinae of mesofemora and metafemora with 2 small serrations near apices.

Female. Unknown.



Figures 51–56. *Neohirasea* spp. 51–54. *N. catbaensis* **sp. nov.** 55–56. *N. coomani* **sp. nov.** 51, 56. Male habitus. 52, 55. Female habitus. 53. Male head and thorax, dorsolateral view. 54. Female head and thorax, dorsolateral view. Scale bars = 5 mm.

Measurements. Length. Body, ♂ 35.0 mm; antennae, ♂ 30.0 mm; head, ♂ 3.0 mm; pronotum, ♂ 2.5 mm; mesonotum, 8.0 mm; metanotum, ♂ 2.5 mm; median segment, ♂ 2.0 mm; profemora, ♂ 11.5 mm; mesofemora, ♂ 9.0 mm; metafemur, ♂ 13.0 mm; protibiae, ♂ 13.5 mm; mesotibiae, ♂ 11.5 mm; metatibia, ♂ 17.0 mm.

Material examined. Holotype ♂, Vietnam, Thua Thien Hue, Bachma Mountain, 18 September 2016, He Li (HKES).

Distribution. Vietnam.

Etymology. The specific epithet of this new subspecies is derived from the type locality, Vietnam.

***Neohirasea maerens pseudomaerens* subsp. nov.** (Figs 33–37, 65–68)

Diagnosis. This new subspecies is similar to the nominate *N. maerens maerens* (Brunner von Wattenwyl, 1907) (*s. str.*), but can be diagnosed by one pair of spines on pronotum and one supra-coxal spine on metapleurae in both sexes.

Description. Male. Body slender, distinctly much slender than female. Head oval, as long as pronotum. Occiput with paired spines near middle area, with another paired minute spines near posterior margin in paratype, posterior margin with 6 indistinct swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes rounded and small. Antennae long and filiform, sparsely covered with long bristles, surpassing apices of protarsi; scapus flattened at base, about 2 times as long as pedicellus; third segment longer than combined length of scapus and pedicellus. Thorax with very few small granules. Pronotum rectangular, longer than wide, anterior and posterior margins nearly truncate; transverse and longitudinal sulci crossing at middle area, with paired spines on anterior margin, apices slightly pointing forwards. Mesonotum elongate, more than 3 times as long as pronotum, gently expanded posteriorly; median longitudinal carina indistinct, with paired spines anteriorly, post-medially and posteriorly, also with paired mediolateral spines, lateral margins with a few short and small spines. Metanotum longer than median segment, with paired spines post-medially. Mesopleurae and metapleurae with a medial spine and a supra-coxal spine. Median segment rectangular, longer than wide, with paired spines post-medially. Second to fourth tergites with paired spines posteriorly. Eighth tergum with a small hump-like crest posteromedially, slightly longer than ninth tergum. Anal segment longer than ninth tergum, with a broad V-shaped emargination on posterior margin. Poculum cup-shaped, posterior margin weakly emarginated and surpassing anterior margin of anal segment. Cerci flattened, curved inwards, apices rounded and not surpassing posterior margin of anal segment. Vomer with posteriorly constricted apical part, apex distinctly pointed and slightly curved. Legs very slender and long, sparsely covered with short bristles. All femora thicker than corresponding tibiae. Profemora curved basally, anteroventral carina lacking serration or with a small serration near apex, posteroventral carina with 1 to 2 small serrations near apex. Posteroventral and anteroventral carinae of mesofemora and metafemora with 2 small serrations near apices. All tibiae maculated and unarmed.

Female. Body robust, distinctly larger and more robust than male. Head oval, longer than wide, as long as pronotum. Occiput gently convex, with 2 pairs of spines, posterior margin of head with 8 small swellings. Median longitudinal furrow distinct, lateral longitudinal furrows indistinct. Compound eyes oval and small. Antennae filiform and long, sparsely covered with short bristles; scapus flattened basally, shorter than third segment; pedicellus shorter than scapus; third segment almost as long as combined length of scapus and pedicellus. Thorax rough, with granules and spines. Pronotum rectangular, longer than wide, anterior margin with a pair of short spines, apices pointing forwards, transverse and longitudinal sulci crossing just before middle area. Mesonotum expanded posteriorly, parallel-sided after middle area, median longitudinal carina distinct, centrally elevated with an obscure hump, armed with paired spines, also surrounded with a few small spines; also with paired spines anteriorly, pre-medially and posteriorly, also with paired mediolateral spines, lateral margins with long spine. Metanotum longer than median segment, median longitudinal carina indistinct, with paired spines post-medially, lateral margins with a short spine pre-medially. Mesopleurae and metapleurae with a few spines and a supra-coxal spine. Abdomen wrinkled, mediolongitudinal carina weakly elevated. Median segment wider than long, with paired spines post-medially. Second to seventh tergites with indistinct posterolateral angles. Second to fourth tergites with paired spines posteriorly. Fifth and sixth tergites with paired tubercles posteriorly. Seventh sternum with paired carina-like praeopercular organ. Ninth tergum shorter than eighth tergum, with a crest posteromedially. Anal segment longer than ninth tergum, almost as long as eighth tergum, with 2 small emarginations on posterior margin. Subgenital plate mediolongitudinally carinate, scoop-shaped, apex pointed and not reaching posterior margin of anal segment. Cerci small, flattened, apices pointed and not surpassing posterior margin of anal segment. Legs covered with short bristles, maculated. All femora thick-built, thicker than corresponding tibiae, anterodorsal, posterodorsal, anteroventral and posteroventral carinae weakly waved. Profemora curved basally, anteroventral carina with a small serration near apex, posteroventral carina with 2 small serrations near apex. Anteroventral and posteroventral carinae of mesofemora and metafemora with 2 small serrations near apices. All tibiae unarmed.

Measurements. Length. Body, ♂ 42.0–51.0 mm, ♀ 64.0 mm; antennae, ♂ 36.0–48.0 mm, ♀ 42.0 mm; head, ♂ 3.0 mm,

♀ 4.5 mm; pronotum, ♂ 3.0 mm, ♀ 4.5 mm; mesonotum, ♂ 10.0–13.0 mm, ♀ 16.0 mm; metanotum, ♂ 3.0–4.5 mm, ♀ 5.0 mm; median segment, ♂ 2.5 mm, ♀ 3.0 mm; profemora, ♂ 15.0–17.0 mm, ♀ 17.0 mm; mesofemora, ♂ 13.0 mm, ♀



Figures 57–68. *Neohirasea* spp. 57–60. *N. hilli hilli* **sp. nov. & subsp. nov.** 61, 63. *N. hilli nahangensis* **subsp. nov.** 62, 64. *N. hilli vietnamensis* **subsp. nov.** 65–68. *N. maerens pseudomaerens* **subsp. nov.** 57, 61–62, 65. Male habitus. 58, 66. Female habitus. 59, 63–64, 67. Male head and thorax, dorsolateral view. 60, 68. Female head and thorax, dorsolateral view. Scale bars=5 mm.

14.0mm; metafemora, ♂ 16.0–18.0mm, ♀ 20.0mm; protibiae, ♂ 17.0–18.0mm, ♀ 20.0mm; mesotibiae, ♂ 12.0–13.0mm, ♀ 15.0mm; metatibiae, ♂ 18.0–20.0mm, ♀ 24.0mm.

Material examined. Holotype ♂, North Vietnam, NaHang Nature Reserve, In 2° forest not on plant (22°16'–22°31'N, 105°22'–105°29'E), 16 July 1996, M.J. Hill, F3309.16, VN9603 P.15 (MMUE). Paratypes. 1♂, North Vietnam, NaHang Nature Reserve, On Euphorbiaceae (22°16'–22°31'N, 105°22'–105°29'E), 24 July 1996, M.J. Hill, F3309.15, VN9603 P.35 (HKES); 1♀, North Vietnam, NaHang Nature Reserve, 2° forest beyond NaChang on *Dillenia* (22°16'–22°31'N, 105°22'–105°29'E), 31 July 1996, M.J. Hill, F3309.38, VN9603 P.39 (MMUE).

Distribution. Vietnam.

Etymology. The specific epithet of this new species is derived from the Latin words “*pseudo*” for spurious and “*maerens*” referring to the close relationship with *N. maerens maerens* (Brunner von Wattenwyl, 1907) (*s. str.*) in the genus.

Acknowledgements I wish to deeply thank Dr. Xingyue Liu (China Agricultural University, Beijing, China) for providing valuable collecting information on the phasmids collected from Vietnam; Dr. Dmitri Logunov (Manchester Museum, The University of Manchester, U.K.) for taking specimens' photos and arranging loan of specimens; Dr. Thies Büscher (Kiel University, Germany) for providing photos of live specimens and required literatures; Dr. Peter Schwendinger (Museum of Natural History, Geneva, Switzerland) for providing type specimens' photos; the Institute of Zoology, Chinese Academy of Sciences, Beijing, China, China Agricultural University, Beijing, China and Manchester Museum, The University of Manchester, U.K. for giving access to the corresponding collections and loan of specimens; and the anonymous reviewers for providing comments to improve the manuscript.

References

- Bradler, S. 2009. Die Phylogenie der Stab- und Gespenstschrecken (Insecta: Phasmatodea). *Species, Phylogeny and Evolution*, 2: 3–139.
- Bradler, S., Robertson, J.A., Whiting, M.F. 2014. A molecular phylogeny of Phasmatodea with emphasis on Necrosiinae, the most species-rich subfamily of stick insects. *Systematic Entomology*, 39(2): 1–18.
- Bragg, P.E. 2001. *Phasmids of Borneo*. Natural History Publications, Kota Kinabalu. 772 pp.
- Brock, P.D., Büscher, T., Baker, E. 2017. Phasmida Species File Online, version 5.0/5.0. Available from <http://phasimida.speciesfile.org/HomePage/Phasmida/HomePage.aspx>. (accessed 12 March 2017)
- Brunner von Wattenwyl, K. 1907. *Die Insektenfamilie der Phasmiden. II. Phasmidae Anareolatae (Clitumnini, Lonchodini, Bacunculini)*. Wilhelm Engelmann, Leipzig. 157 pp.
- Carl, J. 1913. Phasmides nouveaux ou peu connus du Muséum de Genève. *Revue Suisse de Zoologie*, 21: 1–56.
- Chen, S.C., He, Y.H. 2008. *Phasmatodea of China*. China Forestry Publishing House, Beijing, China. 476 pp.
- Clark, J.T. 1976. The capitulum of phasmid eggs (Insecta: Phasmida). *Zoological Journal of the Linnean Society, London*, 59: 365–375.
- Clark, J.T. 1988. The capitula of phasmid eggs: an update with a review of the current state of phasmid ootaxonomy. *Zoological Journal of the Linnean Society, London*, 93: 273–282.
- Clark, J.T. 1998. The micropylar plate of the eggs of Phasmida, with a survey of the range of plate form within the order. *Systematic Entomology*, 23: 203–228.
- Clark-Sellick, J.T. 1997. The range of egg capsule morphology within the Phasmatodea and its relevance to the taxonomy of the order. *Italian Journal of Zoology*, 64: 97–104.
- Haan, W.de. 1842. Bijdragen tot de Kennis der Orthoptera. In: Temminck, C.J. (ed.). *Verhandlungen over de natuurlijke Geschiedenis der Nederlandsche overzeesche Bezittingen, Verhandelingen Zoologie*, vol. 2. Luchtmans and van der Hoek, Leiden. pp. 95–138.
- Hausleithner, B. 1992. Eine neue *Menexenus*-Art aus NE-Indien und Vorarbeiten zu einer Revision der Gattungen *Menexenus* und *Neohirasea* (Phasmatodea: Phasmatidae: Lonchodinae). *Entomologische Zeitschrift*, 102: 423–434.
- Hennemann, F.H., Conle, O.V. 2008. Revision of Oriental Phasmatodea: The tribe Pharnaciini Günther, 1953, including the description of the world's longest insect, and a survey of the family Phasmatidae Gray, 1835 with keys to the subfamilies and tribes (Phasmatodea: "Anareolatae": Phasmatidae). *Zootaxa*, 1906: 1–316.
- Hennemann, F.H., Conle, O.V., Zhang, W.W. 2008. Catalogue of the Stick and Leaf-insects (Phasmatodea) of China, with a faunistic analysis, review of recent ecological and biological studies and bibliography (Insecta: Orthoptera: Phasmatodea). *Zootaxa*, 1735: 1–76.
- Hennemann, F.H., Conle, O.V., Brock, P.D., Seow-Choen, F. 2016. Revision of the Oriental subfamily Heteropteryginae Kirby, 1896, with a re-arrangement of the family Heteropterygidae and the descriptions of five new species of *Haaniella* Kirby, 1904. (Phasmatodea: Areolatae: Heteropterygidae). *Zootaxa*, 4159: 1–219.
- Ho, G.W.C. 2012. Taxonomic study of the tribe Neohiraseini Hennemann & Conle, 2008 (Phasmida: Phasmatidae: Lonchodinae) in continental China. *Entomologica Fennica*, 23: 215–226.

- Ho, G.W.C. 2016. A new subspecies of the genus *Neohirasea* Rehn, 1904 (Phasmida: Diapheromeridae: Necrosiinae) from Guangxi, China. *Bulletin of Hong Kong Entomological Society*, 8(1): 3–7.
- Ho, G.W.C. 2017. Contribution to the knowledge of Chinese Phasmatodea V: New taxa and new nomenclatures of the subfamilies Necrosiinae (Diapheromeridae) and Lonchodinae (Phasmatidae) from the Phasmatodea of China. *Zootaxa*, 4368(1): 1–72.
- Komoto, N., Yukuhiro, K., Ueda, K., Tomita, S. 2011. Exploring the molecular phylogeny of phasmids with whole mitochondrial genome sequences. *Molecular Phylogenetics and Evolution*, 58: 43–52.
- Mandal, S.K., Yadav, K. 2010. Some phasmida (stick and leaf insects) of India. *Records of the Zoological Survey of India Occasional Paper*, 318: 1–64.
- Otte, D., Brock, P.D. 2005. *Phasmida Species File - Catalog of Stick and Leaf Insects of the World*. The Insect Diversity Association and the Academy of Natural Sciences, Philadelphia. 414 pp.
- Redtenbacher, J. 1908. *Die Insektenfamilie der Phasmiden. III. Phasmidae Anareolatae (Phibalosomini, Acrophyllini, Necrosiini)*. Wilhelm Engelmann, Leipzig. 250 pp.
- Rehn, J.A.G. 1904. Studies in the orthopterous family Phasmidae. *Proceedings of the Academy of Natural Sciences of Philadelphia*, 56: 38–107.
- Rehn, J.A.G., Rehn, J.W.H. 1939(1938). The Orthoptera of the Philippine Islands. Part I: Phasmatidae; Obriminae. *Proceedings of the Academy of Natural Sciences, Philadelphia*, 90: 389–487.
- Shiraki, T. 1935. Orthoptera of the Japanese Empire (Part IV) Phasmidae. *Memoirs of the Faculty of Science and Agriculture, Taihoku Imperial University, Formosa*, 14: 23–88.
- Zompro, O. 2004. Revision of the genera of the Areolatae, including the status of *Timema* and *Agathemera* (Insecta, Phasmatodea). *Abhandlungen des Naturwissenschaftlichen Vereins Hamburg*, (NF)37: 1–327.